WORK UNIT SUMMARIES

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UNITED STATES OF AMERICA

DEFENSE TECHNICAL INFORMATION CENTER

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KURT N. MOLHOLM
Administrator
Defense Technical Information Center

DEPARTMENT OF DEFENSE

RESEARCH AND TECHNOLOGY WORK UNIT INFORMATION SYSTEM

REPORT ON:

SPECIFIED WORK UNIT SUMMARIES

SCN: WC3146-960327-214992

PROCESSED: MAR 27, 1996

REQUESTED BY:

GLORIA L. CHAWLA

TO: 03662
UNIVERSITY MARYLAND

COLLEGE PARK, MD 20742

PREPARED BY

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(THIS PAGE IS UNCLASSIFIED)

SEARCH CONTROL NUMBER: WC3146

SEARCH STRATEGY

THE TERMS BELOW WERE SEARCHED BY THE COMPUTER. TRUNCATED RETRIEVAL TERMS INDICATE THAT ALL TERMS WITH THE DEPICTED ROOT HAVE BEEN SEARCHED. TERMS WITH A HIERARCHICAL RELATIONSHIP TO RETRIEVAL TERMS ARE ALSO INCLUDED BELOW. WHEN PARTIAL FILE SEARCHING HAS BEEN APPLIED, DATE RETRIEVAL TERMS ARE DISPLAYED UNDER FIRST LEVEL SEARCH TERMS. EXCLUDED RETRIEVAL TERMS ARE DISPLAYED UNDER EXCLUDE TERMS.

ACCOUNTABILITY RECORD

RESEARCH AND TECHNOLOGY WORK UNIT INFORMATION SYSTEM

DTIC SEARCH CONTROL NO. WC3146

A LIST OF THE SELECTED RECORDS FOLLOW. EACH ENTRY SHOWS: (1) THE AGENCY ACCESSION NUMBER, (2) THE SECURITY CLASSIFICATION CODES OF THE REPORTED FIELDS, (3) THE DISTRIBUTION CODE, AND (4) THE REGRADING CODE.
* INDICATES THERE IS NO NARRATIVE DATA PRESENT.

A - DISTRIBUTION UNLIMITED
B - U.S. GOVT ONLY
C - U.S. GOVT AND THEIR CONTACTORS ONLY
D - DOD AND THEIR CONTRACTORS ONLY
E - DOD ONLY

RD RESTRICTED DATA. THE TERM RESTRICTED DATA MEANS ALL DATA CONCERNING: (1) DESIGN, MANUFACTURE, OR UTILIZATION OF ATOMIC WEAPONS, (2) THE PRODUCTION OF SPECIAL NUCLEAR MATERIAL OR (3) THE USE OF SPECIAL NUCLEAR MATERIALS IN PRODUCTION OF ENERGY, BUT SHALL NOT INCLUDE DATA DECLASSIFIED OR REMOVED FROM THE RESTRICTED DATA CATEGORY PURSUANT TO SECTION 142 OF THE UNITED STATES ATOMIC ENERGY ACT OF 1954 AS AMENDED.

FRD FORMERLY RESTRICTED DATA. INFORMATION WHICH HAS BEEN REMOVED FROM THE RESTRICTED DATA CATEGORY PURSUANT TO SECTION 142(A) OF THE ATOMIC ENERGY ACT OF 1954 AS AMENDED.

REGRADING - CONSULT WITH DTIC TO DETERMINE COMPLETE CLASSIFICATION AUTHORITY, DURATION, AND CHANGE MARKING.

DTIC SEARCH CONTROL NO. WC3146

AGENCY ACCESSION	RECD	WORK	APPR	OBJV	PROG	PROD	DSCR	DIST CODE	ADD NOT	RE-GRD
DF594616	U	U	U	U	U	U	U	C		
DN051124	U	U	U	U	U	U	U	C		
DN051351	U	U	U	U	U	U	U	C		

WC3146 STATISTICS MAR 27, 1996 (960327)

DIGRAPH	UNCLASSIFIED	CONFIDENTIAL	SECRET	TOTAL
DF	1	0	0	1
DN	2	0	0	2

DISTRIBUTION CODES	TOTAL
A - DISTRIBUTION UNLIMITED	0
B - U.S. GOVT ONLY	0
C - U.S. GOVT AND THEIR CONTRACTORS ONLY	3
D - DOD AND THEIR CONTRACTORS ONLY	0
E - DOD ONLY	0
* - NO DATA AVAILABLE	0
TOTAL	3

UNCLASSIFIED
SCN: WC3146-960327-214992 MAR 27, 1996
DTIC FORMAT B0102

WORK UNIT INFORMATION SYSTEM (WUIS)

1. ACCESSION NO: DF594616
1A. ACTIVITY CODE: FGL
2. TRANSACTION TYPE: A
3. STATUS OF EFFORT: N
4. PERFORMANCE METHOD: C
5. PERFORMANCE TYPE: C

6. DATE OF SUMMARY: 24 NOV 1995
7. DATE OF PRECEDING SUMMARY: 15 JUN 1995
8. START DATE: 30 SEP 1993
9. END DATE: 30 DEC 1997

10. EFFORT SECURITY CLASS CODE: (U)
11. EFFORT SECURITY ADDL NOTICE:
12. RECORD SECURITY CLASS CODE: (U)
13. RECORD SECURITY ADDL NOTICE:

14. CLASSIFICATION AUTHORITY:

15. REGRADING CODE:
16. REGRADING DATE:

17. REGRADING EVENT:

18. DISTRIBUTION CODE: C
19. DISTRIBUTION REASON: AD

20. TITLE: 3-D MHD MODELLING OF SOLAR ACTIVITY

21. SUBORDINATE RECORD IND:
22. LINKING ACCESSION NO:

23. LOCAL CTRL NO: 2311G3EC
24. SEARCH CTRL NO: 930303

25. DOD SUBJECT CATEGORIES:
A: 0302 ASTROPHYSICS
B:
C:

26. TAXONOMY CODES

MISSION AREAS	FUNCTIONS	TECHNOLOGIES
A:	A:	A:
B:	B:	B:
C:	C:	C:

27. RESPONSIBLE ORGANIZATION
SOURCE CODE: 422715

ACTIVITY NAME: PHILLIPS LAB HANSCOM AFB MA

SPECIFIC COMPONENT: SOLAR RESEARCH BR

CITY: HANSCOM AFB

STATE/COUNTRY CODE: MA
ZIP CODE: 017315000
GEOPOL CODE: 2505

RESPONSIBLE INDIVIDUAL: KEIL STEPHEN

OFFICE/CODE: GPSS
COMM PHONE: 505-846-7039
DSN: 434-7039

28. PERFORMING ORGANIZATION
SOURCE CODE: 387300

ACTIVITY NAME: CALIFORNIA UNIV IRVINE

SPECIFIC COMPONENT:

CITY: IRVINE

STATE/COUNTRY CODE: CA ZIP CODE: GEOPOL CODE: 0640

PRINCIPAL INVESTIGATOR: VAN HOVEN, GERARD

OFFICE/CODE: COMM PHONE: DSN:

ASSOCIATE INVESTIGATOR:

30. PRIMARY FUNDING DATA

PROGRAM ELEMENT NO	PROJECT NO	TASK NO
0603707F	2311	G3

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS
96	50	00.0
	0	
95	110	00.0
94	126	00.0
	0	

31. 1ST CONTRIBUTING FUNDING DATA

PROGRAM ELEMENT NO	PROJECT NO	TASK NO

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS
	0	
	0	
	0	
	0	
	0	

32/33. 2ND CONTRIBUTING FUNDING DATA/ROLLUP INDICATOR

PROGRAM ELEMENT NO	PROJECT NO	TASK NO

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS	ROLLUP IND
	0		
	0		
	0		
	0		
	0		

34. CONTRACT/GRANT/TRANSFER NO: F1962893C0136

EFECTIVE DATE: 30 SEP 1993 EXPIRATION DATE: 30 JUN 1997

FACE VALUE: 742 CUMULATIVE TO DATE TOTAL: 126

35. KEYWORDS: SOLAR PREDICTIONS, SOLAR ACTIVITY, SOLAR MAGNETOHYDRODYNAMICS, SOLAR MODELING

36. OBJECTIVE: (U) DEVELOP A THREE-DIMENSIONAL MAGNETOHYDRODYNAMICAL MODEL OF SOLAR ACTIVE REGION EVOLUTION. THE MODEL WILL USE SOLAR VELOCITY AND MAGNETIC FIELD OBSERVATIONS AS INPUTS, COMPUTE THE EVOLUTION OF THE MAGNETIC FIELD BASED ON THE OBSERVED FLOWS, AND OUTPUT A PREDICTION FOR THE CONFIGURATION AND STABILITY OF THE FIELD AT SUBSEQUENT TIMES. THE EFFORT IS DIRECTED TOWARDS DEVELOPMENT OF COMPUTER GENERATED SOLAR ACTIVITY FORECASTS THAT CAN SERVE AS

INPUTS FOR WARNINGS AND ALERTS OF SOLAR DRIVEN "SPACE WEATHER".

37. APPROACH: (U) VERIFY THE SENSITIVITY AND ACCURACY OF EXISTING QUASI-STATIC AND DYNAMICAL MODELS THAT USE MEASUREMENTS OF THE SOLAR PHOTOSPHERIC MAGNETIC FIELD AS INPUTS TO COMPUTE THE MAGNETIC STRUCTRUE OF THE OVERLYING ATMOSPHERE. TEST THE HYPOTHESIS THAT ENERGY RELEASED AS SOLAR ACTIVITY IS STORED IN CORONAL MAGNETIC FIELDS BY MODELING THE EVOLUTION OF THE MAGNETIC STRUCTURES DURING THE VARIOUS PHASES IN THE EVOLUTION OF AN ACTIVE REGION. TEST THE THEORY THAT MOTIONS IN THE LOWER SOLAR ATMOSPHERE ARE ABLE TO PROVIDE THIS ENERGY. ESTABLISH CRITERIA FOR THE DESIGN AND PERFORMANCE OF SOLAR INSTRUMENTS PLANNED AS PART OF THE AIR FORCE SOLAR OPTICAL OBSERVING NETWORK AND NEEDED TO SUPPLY DATA FOR THE MODEL. USE THE MODEL TO IDENTIFY AND PARAMETERIZE PRECURSORS TO SOLAR ACTIVITY EVENTS.

38. PROGRESS: (U) (941001 - 950930) THIS PERIOD CONCENTRATED ON THE FORMATION AND EVOLUTION OF HELMET STREAMERS (LARGE MAGNETIC FEATURES IN THE SOLAR CORONA) USING TIME-DEPENDENT MHD SIMULATIONS. THE RESPONSE OF HELMET STREAMERS TO PHTOSPHERIC SHEARING FLOW IS TO DISRUPT, WITH THE EJECTION OF A PLASMOID THAT IS ACCELERATED UP TO THE LOCAL SOLAR WIND VELOCITY. CALCULATIONS HOW THAT THE CONTINUED STRESS INDUCED ON THE MAGNETIC FIELD BY DIFFERENTIAL ROTATION CAN LEAD TO A SERIES OF CORONAL MASS EJECTIONS FROM THE SUN. COMPARISON OF CORONAL LOOP STRUCTURE COMPUTED WITH THEIR MODEL AND ECLIPSE PHOTOGRAPHS SHOW GOOD AGREEMEHT. IN ADDTION THE 3-D MHD SIMULATIONS PRODUCE A MUCH MORE ACCURATE DETERMINATION OF THE POSTION OF THE HELIOSPHERIC CURRENT SHEET THAN PREVIOUSLY POSSIBLE. THIS HAS BEEN VERIFIED USING SOLAR WIND DATA FROM THE ULYSSES SPACECRAFT. (9310 - 9409) CALCULATIONS AND MODELING PERFORMED UNDER THIS CONTRACT HAVE SHOWN THE RECONNECTIVE DISSIPATION OF CURRENT SHEETS CAN PROVIDE ENOUGH ENERGY TO LOCALLY HEAT THE CORONA. GRANULAR CONVECTION AT THE SOLAR SURFACE CAN DRIVE LARGE ELECTRIC CURRENTS. A FORMALISM FOR TREATING THE EMERGENCE OF MAGNETIC FLUX IN MHD SIMULATIONS WAS DEVELOPED. A 3-D RESISTIVE MHD CODE WAS ADAPTED TO INVESTIGATE THE FORMATION OF MAGNETIC LOOPS IN THE CORONA. THEY DEMONSTRATED THAT VORTEX MOTIONS OF MAGNETIC FOOTPOINTS CAN CAUSE LOOPS TO FORM AND BECOME UNSTABLE, AND RISE. IN ADDITION TO THE RISING MOTIONS, THE LOOPS ALSO DEVELOP INTO HELICAL SHAPES, AND CAN BECOME PINCHED OFF TO FORM THIN CURRENT CARRYING LAYERS. THE CODES ARE BEING APPLIED TO SOLAR ACTIVITY, SUCH AS FLARES AND CORONAL MASS EJECTIONS, TO DETERMINE CAUSES.

39. PRODUCTS

39.5 PRODUCT INDICATOR:

40. DOMESTIC TECHNOLGY TRANSFER:

41. STUDIES AND ANALYSIS CATEGORIES:

42. SPECIAL STUDIES SUBJECTS:

44. PRIMARY PROJECT SERIAL NO:

45. INTERNATL SOURCES CONSIDERED:

46. PROCESSING DATE: 21 DEC 1995

47. RECEIPT DATE: 21 DEC 1995

48. DESCRIPTORS: (U) ACCURACY, AIR FORCE, ATMOSPHERES, CODING, CORONAS, DETERMINATION, DIFFERENTIAL GEOMETRY, DISSIPATION, DRIVES, DYNAMICS, ECLIPSES, EJECTION, ELECTRIC CURRENT, EVOLUTION(GENERAL), FLUX(RATE), HELIXES, HYPOTHESES, LOOPS, LOW ALTITUDE, MAGNETIC FIELDS, MAGNETIC MATERIALS, MAGNETOHYDRODYNAMICS, METEOROLOGICAL DATA, MODELS, MOTION, PHOTOGRAPHS, PHOTOSPHERE, REGIONS, ROTATION, SHAPE, SHEETS, SIMULATION, SOLAR ACTIVITY, SOLAR ATMOSPHERE, SOLAR CORONA, SOLAR DISTURBANCES, SOLAR WIND, SPACECRAFT, STABILITY, STRUCTURES, SUN, SUPPLIES, THINNESS, THREE DIMENSIONAL, TIME DEPENDENCE, VORTICES, WARNING SYSTEMS, WIND, WIND VELOCITY

WORK UNIT INFORMATION SYSTEM (WUIS)

1. ACCESSION NO: DN051124
1A. ACTIVITY CODE: NONR
2. TRANSACTION TYPE: M
3. STATUS OF EFFORT: C
4. PERFORMANCE METHOD: G
5. PERFORMANCE TYPE: R

6. DATE OF SUMMARY: 19 OCT 1994
7. DATE OF PRECEDING SUMMARY: 15 SEP 1993
8. START DATE: DEC 1990
9. END DATE: NOV 1995

10. EFFORT SECURITY CLASS CODE: (U)
11. EFFORT SECURITY ADDL NOTICE:
12. RECORD SECURITY CLASS CODE: (U)
13. RECORD SECURITY ADDL NOTICE:

14. CLASSIFICATION AUTHORITY:

15. REGRADING CODE:
16. REGRADING DATE:

17. REGRADING EVENT:

18. DISTRIBUTION CODE: C
19. DISTRIBUTION REASON:

20. TITLE: NUMERICAL CALCULATIONS OF INTRINSICALLY CORRELATED ELECTRON SYSTEMS

21. SUBORDINATE RECORD IND:
22. LINKING ACCESSION NO:

23. LOCAL CTRL NO: 312TI01---07
24. SEARCH CTRL NO:

25. DOD SUBJECT CATEGORIES:

A:	2012	SOLID STATE PHYSICS
B:	2013	THERMODYNAMICS
C:	1203	STATISTICS AND PROBABILITY

26. TAXONOMY CODES

MISSION AREAS	FUNCTIONS	TECHNOLOGIES
A:	A:	A:
B:	B:	B:
C:	C:	C:

27. RESPONSIBLE ORGANIZATION
SOURCE CODE: 265250

ACTIVITY NAME: OFFICE OF NAVAL RESEARCH ARLINGTON VA

SPECIFIC COMPONENT: OFFICE OF NAVAL RESEARCH DEPARTMENT OF THE NAVY

CITY: ARLINGTON

STATE/COUNTRY CODE: VA
ZIP CODE: 222170000
GEOPOL CODE: 5110

RESPONSIBLE INDIVIDUAL: REYNOLDS, P J

OFFICE/CODE:
COMM PHONE: 703 696-4205 0000
DSN:

28. PERFORMING ORGANIZATION
SOURCE CODE: 387300

ACTIVITY NAME: CALIFORNIA UNIV IRVINE

SPECIFIC COMPONENT: UNIVERSITY OF CALIFORNIA, IRVINE

CITY: IRVINE

STATE/COUNTRY CODE: CA ZIP CODE: GEOPOL CODE: 0640

PRINCIPAL INVESTIGATOR: WHITE, S R

OFFICE/CODE: COMM PHONE: 714 725-2256 DSN:

ASSOCIATE INVESTIGATOR:

30. PRIMARY FUNDING DATA

PROGRAM ELEMENT NO	PROJECT NO	TASK NO
0601153N	RR01103	RR0110301

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS
	0	
	0	
95	100	01.2
94	95	01.1
93	95	01.1

31. 1ST CONTRIBUTING FUNDING DATA

PROGRAM ELEMENT NO	PROJECT NO	TASK NO

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS
	0	
	0	
	0	
	0	
	0	

32/33. 2ND CONTRIBUTING FUNDING DATA/ROLLUP INDICATOR

PROGRAM ELEMENT NO	PROJECT NO	TASK NO

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS	ROLLUP IND
	0		
	0		
	0		
	0		
	0		

34. CONTRACT/GRANT/TRANSFER NO: N0001491J1143

EFECTIVE DATE: 01 DEC 1994 EXPIRATION DATE: 30 NOV 1995

FACE VALUE: 100 CUMULATIVE TO DATE TOTAL: 565

35. KEYWORDS: STRONG CORRELATION, HUBBARD MODELS, QUANTUM MONTE CARLO, HIGH T SUPERCONDUCTIVITY

36. OBJECTIVE: (U) THE GOAL IS TO DEVELOP AND APPLY QUANTUM MONTE CARLO TECHNIQUES FOR THE CALCULATION OF THE TWO-PARTICLE INTERACTION VERTEX OF THE HUBBARD AND RELATED MODELS, TO PERFORM NUMERICAL RG ON A VARIETY OF SPIN CHAIN SYSTEMS USING THE NEW DENSITY MATRIX FORMULATION, AND IMPLEMENTING A HYBRID, BLOCK WORLD-LINE METHOD THAT COMBINES QMC AND RG THAT MAY ALSO MINIMIZE THE

USUAL FERMION SIGN PROBLEM. FREQUENCY DEPENDENT CONDUCT- IVITIES AND MAGNETIC SUSCEPTIBILITIES WILL BE CALCULATED. RESULTS WILL PROVIDE INSIGHT INTO POSSIBILE SUPERCONDUCTIVITY IN VARIOUS 2D MODELS.

37. APPROACH: (U) QUANTUM MONTE CARLO, RENORMALIZATION GROUP, EXACT DIAGONALIZATION, AND HYBRID METHODS WILL BE USED IN THE TREATMENT OF HUBBARD AND RELATED MODELS ON A 2D LATTICE AND 1D SPIN CHAINS. ANALYTIC CONTINUATION METHODS WILL BE USED TO OBTAIN DYNAMICAL INFORMATION FROM THE SIMULATIONS. A NEW METHOD, THE BLOCK WORLD-LINE APPROACH, IS BEING DEVELOPED THAT APPEARS TO BE LESS TROUBLED BY THE FERMION SIGN PROBLEM, AND IS A FIRST STEP TOWARD A QUANTUM MONTE CARLO RENORMALIZATION GROUP.

38. PROGRESS: (U) THIS PROGRAM IS ONGOING.

39. PRODUCTS

39.5 PRODUCT INDICATOR: N

40. DOMESTIC TECHNOLGY TRANSFER: HI

41. STUDIES AND ANALYSIS CATEGORIES: O

42. SPECIAL STUDIES SUBJECTS:

44. PRIMARY PROJECT SERIAL NO:

45. INTERNATL SOURCES CONSIDERED:

46. PROCESSING DATE: 25 NOV 1994

47. RECEIPT DATE: 18 MAR 1993

48. DESCRIPTORS: (U) CHAINS, COMPUTATIONS, DYNAMICS, ELECTRONS, HYBRID SYSTEMS, MONTE CARLO METHOD, NUMERICAL ANALYSIS, PERMEABILITY(MAGNETIC), QUANTUM THEORY, SPINNING(MOTION), SUPERCONDUCTIVITY

WORK UNIT INFORMATION SYSTEM (WUIS)

1. ACCESSION NO: DN051351
1A. ACTIVITY CODE: NONR
2. TRANSACTION TYPE: M
3. STATUS OF EFFORT: D
4. PERFORMANCE METHOD: G
5. PERFORMANCE TYPE: R

6. DATE OF SUMMARY: 31 AUG 1994
7. DATE OF PRECEDING SUMMARY: 16 DEC 1993
8. START DATE: JUL 1991
9. END DATE: JUN 1994

10. EFFORT SECURITY CLASS CODE: (U)
11. EFFORT SECURITY ADDL NOTICE:
12. RECORD SECURITY CLASS CODE: (U)
13. RECORD SECURITY ADDL NOTICE:

14. CLASSIFICATION AUTHORITY:

15. REGRADING CODE:
16. REGRADING DATE:

17. REGRADING EVENT:

18. DISTRIBUTION CODE: C
19. DISTRIBUTION REASON:

20. TITLE: DEFECTS AND DISORDERED SOLIDS

21. SUBORDINATE RECORD IND:
22. LINKING ACCESSION NO:

23. LOCAL CTRL NO: 1216032---06
24. SEARCH CTRL NO:

25. DOD SUBJECT CATEGORIES:
A: 2012 SOLID STATE PHYSICS
B: 2013 THERMODYNAMICS
C:

26. TAXONOMY CODES

MISSION AREAS	FUNCTIONS	TECHNOLOGIES
A:	A:	A:
B:	B:	B:
C:	C:	C:

27. RESPONSIBLE ORGANIZATION SOURCE CODE: 265250

ACTIVITY NAME: OFFICE OF NAVAL RESEARCH ARLINGTON VA

SPECIFIC COMPONENT: OFFICE OF NAVAL RESEARCH DEPARTMENT OF THE NAVY

CITY: ARLINGTON

STATE/COUNTRY CODE: VA ZIP CODE: 222170000 GEOPOL CODE: 5110

RESPONSIBLE INDIVIDUAL: LIEBENBERG, D H

OFFICE/CODE: COMM PHONE: 703 696-4219 9000 DSN:

28. PERFORMING ORGANIZATION SOURCE CODE: 387300

ACTIVITY NAME: CALIFORNIA UNIV IRVINE

SPECIFIC COMPONENT: UNIVERSITY OF CALIFORNIA, IRVINE

CITY: IRVINE

STATE/COUNTRY CODE: CA ZIP CODE: GEOPOL CODE: 0640

PRINCIPAL INVESTIGATOR: YU, C

OFFICE/CODE: COMM PHONE: 714 856-6216 DSN:

ASSOCIATE INVESTIGATOR:

30. PRIMARY FUNDING DATA

PROGRAM ELEMENT NO	PROJECT NO	TASK NO
0601153N	RR02102	RR0210201

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS
	0	
	0	
95	60	00.7
94	15	00.1
93	60	00.7

31. 1ST CONTRIBUTING FUNDING DATA

PROGRAM ELEMENT NO	PROJECT NO	TASK NO
0601153N	RR01102	RR0110203

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS
	0	
	0	
	0	
	0	
	0	

32/33. 2ND CONTRIBUTING FUNDING DATA/ROLLUP INDICATOR

PROGRAM ELEMENT NO	PROJECT NO	TASK NO

FISCAL YEAR	DOLLAR AMOUNT (THOUSANDS)	WORK YEARS	ROLLUP IND
	0		
	0		
	0		
	0		
	0		

34. CONTRACT/GRANT/TRANSFER NO: N0001491J1502

EFECTIVE DATE: 01 OCT 1994 EXPIRATION DATE: 30 JUN 1994

FACE VALUE: 60 CUMULATIVE TO DATE TOTAL: 310

35. KEYWORDS: DISORDER IN SOLIDS, DEFECTS IN AMORPHOUS SOLIDS, THERMAL AND ACOUSTIC PROPERTIES, THEORETICAL TREATMENT OF INTERACTING DEFECTS

36. OBJECTIVE: (U) THE OBJECTIVE OF THIS RESEARCH IS TO DEVELOP A THEORETICAL UNDERSTANDING OF THE SIMILARITY OF A WIDE VARIETY OF AMORPHOUS SOLIDS IN THEIR THERMAL AND ACOUSTIC PROPERTIES. DEFECTS AND DISORDER PLAY AN IMPORTANT ROLE AND THEIR INTERACTION VIA THE ELASTIC STRAIN FIELD WILL BE DETERMINED.

37. APPROACH: (U) THE PLANNED CALCULATIONS WILL ESTABLISH A CONCEPTUAL BASIS

FOR THE MODEL OF DISORDER AND DEFECTS IN GLASSES AS WELL AS MAKING QUANTITATIVE COMPARISON WITH EXPERIMENT. THE EXTENT TO WHICH INTEREACTIONS BETWEEN DEFECTS MUST BE INCLUDED AND THE EFFECTS OF IMPURITIES IN THESE CORRELATED ELECTRON SYSTEMS WILL BE EMPHASIZED. A NUMERICAL SIMULATION OF AN INTERACTING DEFECT SYSTEM WILL BE PERFORMED TO OBTAIN THE DENSITY OF DEFECT STATES AND FROM AN AVERAGE OF FINAL CONFIGURATIONS TO CALCULATE THE THERMAL EXPANSION COEFFICIENT.

38. PROGRESS: (U) A THEORETICAL INTERPRETATION OF RECENT EXPERIMENTS BY A STANFORD GROUP WAS CARRIED OUT. THE EXPERIMENTS FOUND UNEXPECTED DIELECTRIC PROPERTIES OF GLASS SAMPLES AT LOW TEMPERATURES, ESPECIALLY A FREQUENCY DEPENDENCE. THE PI APPLIED THE NON-INTERACTING TLS THEORY AND FOUND THAT ALTHOUGH THE LOGARITHMIC DECAY OF AN IMPRESSED LARGE DC ELECTRIC FIELD PULSE COULD BE EXPLAINED, THE FREQUENCY DEPENDENCE COULD NOT BE FIT BY THIS THEORY. THE FREQUENCY DEPENDENCE COULD BE FIT BY INCLUDING THE INTERACTIONS BETWEEN DEFECTS IN THE TLS. FURTHER, THE SIMPLE INTERACTION BETWEEN DEFECTS DID NOT GIVE QUALITATIVE AGREEMENT AND IT WAS NECESSARY TO INTRODUCE CLUSTERS OF DEFECTS WITH THE ATTENDANT INTERNAL (TO THE CLUSTERS) MODES TO OBTAIN THE QUALITATIVE AGREEMENT. A MONTE CARLO SIMULATION IN THREE DIMENSIONS GAVE GOOD QUALITATIVE AGREEMENT.

39. PRODUCTS

39.5 PRODUCT INDICATOR: N	40. DOMESTIC TECHNOLGY TRANSFER: HI
41. STUDIES AND ANALYSIS CATEGORIES: O	42. SPECIAL STUDIES SUBJECTS:
44. PRIMARY PROJECT SERIAL NO:	45. INTERNATL SOURCES CONSIDERED:
46. PROCESSING DATE: 09 FEB 1995	47. RECEIPT DATE: 18 MAR 1993

48. DESCRIPTORS: (U) ACOUSTIC PROPERTIES, AMORPHOUS MATERIALS, CLUSTERING, COEFFICIENTS, COMPARISON, CONFIGURATIONS, DECAY, DEFECTS(MATERIALS), DIELECTRIC PROPERTIES, ELECTRONS, FREQUENCY, GLASS, IMPURITIES, INTERACTIONS, LOGARITHM FUNCTIONS, LOW TEMPERATURE, MATHEMATICAL MODELS, MODELS, MONTE CARLO METHOD, NUMERICAL ANALYSIS, ORDER DISORDER TRANSFORMATIONS, SAMPLING, SIMULATION, SOLIDS, THERMAL EXPANSION, THERMAL PROPERTIES